September 1992

Curculionoidea of southern Florida: An annotated checklist (Coleoptera: Curculionoidea [excluding Curculionidae; Scolytinae, Platypodinae])

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Abstract

The fauna of Curculionoidea (exclusive of the subfamilies Scolytinae and Platypodinae of the Curculionidae) is surveyed for Dade and Monroe Counties in southern Florida. Numbers of genera and species represented are as follows: Anthribidae (12 genera, 22 species), Belidae (1 genus, 2 species), Attelabidae (3 genera, 3 species), Brentidae (6 genera, 14 species) and Curculionidae (115 genera, 249 species). No Nemonychidae are recorded from southern Florida. Included in the totals are 25 species considered as introduced to the region and 5 species likely not established in the region.

Twenty apparently undescribed species are recorded. Fifteen are assignable to genera as follows; *Ormiscus* (2)(Anthribidae), and *Podapion* (1)(Brentidae), and *Prosaldius* (1), *Acalles* (6), *Calles* (1), *Zascelis* (1), *Notolomus* (1), *Lixus* (1), and *Conotrachelus* (1) (Curculionidae). The generic placement of 5 undescribed species of Curculionidae is uncertain and descriptions of new genera may be required.

New generic records for the United States of America are *Homocloeus* Jordan (Anthribidae), and *Stenotrupis* Wollaston (Curculionidae; Cossoninae) and *Heilus* Kuschel (Curculionidae; Curculioninae). New species records for the United States are *Homocloeus distentus* Frieser and *Homocloeus sexverrucatus* (Suffrian) (Anthribidae) and *Stenotrupis acicula* Wollaston, *Caulophilus rufotestaceus* (Champion), *Micromimus minimus* (Boheman) (Curculionidae; Cossoninae), and *Anthonomus rubricosus* Boheman and *Heilus bioculatus* (Boheman) (Curculionidae; Curculioninae).

Particularly well-represented in terms of species diversity is the anthribid genus *Ormiscus* (6), the brentid genus *Apion* (9) and the curculionid genera *Listronotus* (21), *Anthonomus* (14), *Acalles* (13), *Conotrachelus* (11), *Tyloderma* (10) and *Sphenophorus* (10).

Introduction

Southern Florida is a naturalist's paradise; however, like the rest of Florida this paradise is being threatened by rampant development that is rapidly destroying natural habitats, upsetting a precarious ecological balance and leading to the potential extirpation of rare and endangered species, some of which occur in the United States nowhere else but extreme southern Florida. Twenty-eight of the 218 endangered invertebrates in Florida occur in the United States only in southern Florida (Franz 1982).

Although a great portion of mainland south Florida is preserved in Everglades National Park, the park has not been immune to the changes taking place throughout the rest of southern Florida (Alper 1992). Development in areas outside the park boundaries has had significant effects on the biota of the park itself. Diversion of water flowing south out of Lake Okeechobee to eastern coastal resort areas and surrounding agricultural lands, through the use of canals, has markedly affected water levels within the park; altered the region's ecology; and is threatening species, supposedly protected within the park, with extinction. Extensive hardwood hammocks and pineland which extended along a ridge west of Miami are largely gone, now preserved only in small, disjunct parks situated amongst the hotels, houses and highways. The Florida Keys also have undergone significant development and yet, even though already considered as ecologically stressed to the limit by the more than 80,000 people who reside there (not to mention the more than 2 million tourists who visit the Keys each year), there is still pressure from local business and other groups for further economic growth (Laycock 1991).

With the primary goal of establishing baseline data documenting the insect fauna of the Florida Keys, Peck (1989) conducted an extensive sampling program in Dade and Monroe Counties in southern Florida from 1981 to 1986 in the belief that there was much to learn about this fauna. Because insects probably comprise over 75% of known species diversity, an inventory could be valuable to resource management specialists for recognition and evaluation of changes in insect species composition and distribution, to plan and implement conservation efforts, and to critically assess sustainable development plans in a manner consistent with the region's fragile ecology.

Based on floral diversity, Peck (1989) proposed that at least some 5,000 insect species would occur in south Florida and presented six general hypotheses concerning diversity, endemism, biogeographic origins, and natural history attributes of the constituent species such as vagility and degree of host plant specificity. Tests of these hypotheses based on a more complete analysis of the curculionoid data contained here are presented in another paper (Anderson and Peck in press).

Surveys of south Florida Scolytinae and Platypodinae (Atkinson and Peck in press), scavenging beetles of the family Scarabaeidae (Peck and Howden 1985), flat bark beetles (Thomas and Peck 1991), ants (Deyrup *et al.* 1988), cockroaches, mantids and walkingsticks (Peck and Benninger 1989), and butterflies (Schwartz 1987) recently have been conducted. Studies of Orthoptera (S.B. Peck) and chrysomelid leaf beetles (E.G. Riley) of south Florida also are currently underway. Recent preliminary checklists of Carabidae (Choate 1990) and Staphylinidae (Frank 1986) of Florida also are available.

Geographic setting

Geography. Florida is a north-south oriented peninsula that extends from about 31° to 24°30' N latitude, its southern tip being just north of the Tropic of Cancer. It is about 230 km wide at its widest point and 600 km from east to west across a slender east-west panhandle. Topographic relief is low, with the highest point being 120 m, immediately south of the Florida-Alabama state line near Paxton. Southern Florida generally is considered to be the region south of Lake Okeechobee. It is made up of seven counties, the most southern of which are Dade and Monroe Counties, which together comprise the southern tip of Florida, including the Florida Keys.

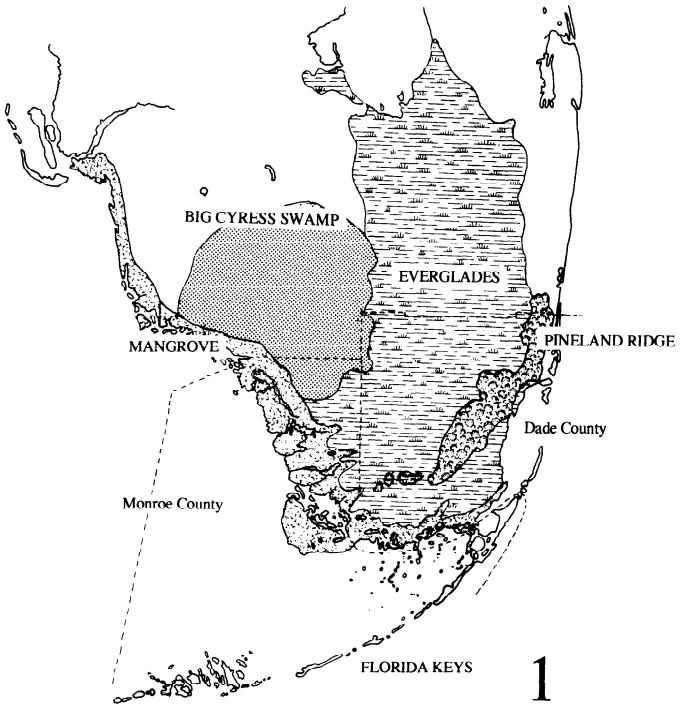

Figure 1. Map of southern Florida showing major physiographic regions (redrawn after Tomlinson 1980).

Five physiographic regions are recognized in Florida south of 27°N, on the basis of a combination of vegetation, surface geology, relief and hydrology (Fig. 1; see also Tomlinson 1980).

1. The Big Cypress Swamp is a low-lying basin which occupies most of Collier County but extends into Monroe and Dade Counties in the extreme north. Drainage from the underlying limestone is poor and wetlands, in particular cypress swamps, are numerous.

2. The Everglades are the most characteristic and famous feature of southern Florida. These are flat, poorly drained wetlands on a limestone base. Essentially a broad shallow river, the Everglades drains most of Florida from Lake Okeechobee south through Dade County then southwest into Monroe County, where it empties into the mangroves along the Gulf of Mexico. Sawgrass (*Cladium jamaicensis* Crantz) dominates these wetlands, hence the popular name "river of grass"; however, to the north, scattered bay heads and cypress domes occur, and further south, tree islands (hammocks) associated with rock outcrops, are found. Ecologically the Everglades is a freshwater swamp with naturally high water levels in summer and low levels in winter and early spring.

Table 1: South Florida localities sampled by SBP from 1981-1986 (Peck 1989, figures 1 & 2). Numbers refer to localities as given herein; numbers in Peck (1989) differ. Localities were sampled with combination malaise/flight intercept traps and by berlese sampling of organic debris (primarily leaf litter).

No.	Locality	Habitat
1	Miami, Matheson Hammock	hardwood hammock
2	Miami, Charles Deering Estate Park	hardwood hammock
3	Miami, Old Cutler Hammock	hardwood hammock/pineland
4	Everglades N.Pk., Long Pine Key	pineland
5	Everglades N.Pk., Palma Vista Hammock	hardwood hammock/pineland
6	Everglades N.Pk., Royal Palm Hammock	hardwood hammock
7	Chekika State Recreation Area	hardwood hammock
8	Key Largo, north end; section 35	hardwood hammock
9	Key Largo, John Pennekamp State Park	hardwood hammock
10	Lignum Vitae Key	hardwood hammock
11	Windley Key	hardwood hammock
12	Long Key	hardwood hammock
13	Fat Deer Key	hardwood hammock
14	Vaca Key, Marathon, section 1	hardwood hammock
15	Ohio Key	hardwood hammock
16	Bahia Honda Key	hardwood hammock
17	No Name Key	hardwood hammock/pineland
18	Big Pine Key, section 4, No Name Road	hardwood hammock/mangrove
19	Big Pine Key, Watson's Hammock	hardwood hammock
20	Big Pine Key, Cactus Hammock	hardwood hammock/coastal scrub
21	Big Pine Key, Watson Blvd.	pineland
22	Middle Torch Key	hardwood hammock
23	Big Torch Key	hardwood hammock
24	Cudjoe Key	hardwood hammock
25	Sugarloaf Key, section 25	hardwood hammock
26	Sugarloaf Key, section 23	hardwood hammock/pineland
27	Stock Island, Botanical Garden	hardwood hammock

Development, in the form of canals and dyke-like roads, has severely altered the region's natural patterns of water flow.

3. The Pinelands Ridge extends from southern Broward County through Dade County in a northeast-southwest direction. Limits are determined by the outcropping ridge of oolitic limestone which forms the eastern ridge of the Everglades and diverts drainage to the southwest. Soils are limey, and pineland dominate. In southwestern Dade County the ridge is discontinuous and forms islands of pineland surrounded by wetlands in Everglades National Park. It is this same limestone formation which is exposed in the Lower Florida Keys, especially Big Pine Key. In addition to the predominant pineland, hardwood hammocks are also found. Both plant communities have been cleared extensively for urban development or agriculture.

4. The Mangrove region fringing southern Florida is delimited largely by the extent of saltwater intrusion but also is dependent on the the land-wards dispersal capabilities of mangrove seedlings. This region is most extensive on the west coast where the Everglades drain into the Gulf of Mexico and on the southern coast. Along the east coast, the mangrove zone is narrow and discontinuous.

5. The Florida Keys are a series of low islands usually not exceeding 3 m in elevation, extending in a gentle curve southwest from Biscayne Bay and eventually almost directly west to Key West. The Keys are divided generally into two groupings. The Upper Keys are a series of northeast-southwest oriented islands from Key Largo south to Knight Key or Pigeon Key. The Lower Keys, from Ohio and Bahia Honda Keys southwest to Key West and the Dry Tortugas approximately 110 km west of Key West, are oriented northwest-southeast. The Keys are drier than the mainland and rainfall decreases westward toward Key West. The Upper Keys are especially well-drained, whereas the Lower Keys, because of their oolite base, trap and hold freshwater from rains. Much of the native vegetation throughout the Keys (especially Key West) has been destroyed by urban development.

Geology. Southern Florida is very young and has experienced a dynamic geological history (Hoffmeister 1974). The mainland is composed almost entirely of Miami limestone with an oolitic and bryozoan facies. In the Florida Keys, the Lower Keys, like the mainland, consist of Miami limestone, whereas the Upper Keys are formed of Key Largo limestone, an ancient coral reef. In these formations, the uppermost oceanic limestones and oolites were deposited about 100,000 years BP, during the Sangamon interglacial period at a time of high sea level when southern Florida was submerged. Lowered sea levels during the Wisconsinan glaciation (80,000-15,000 years BP) exposed southern Florida (including the Florida Keys and Dry Tortugas) as a broadly continuous land mass. During this time, freshwater marls and other organic deposits accumulated. As sea levels rose in the last 10,000 years following deglaciation, the present islands and coastlines were formed.

Climate. The climate of southern Florida is subtropical and seasonal. The summer (May-September) is hot and wet and in contrast, the winter and spring (October-April) are cool and dry. Temperatures range between a July mean of 27.6°C and a January mean of 20°C at Miami; however, temperatures may reach the freezing point in any one year. Distributions of tropical plants, and thus the insects which feed on them, are clearly limited by the 12°C January isotherm (Tomlinson 1980). Rainfall is very seasonal, with a mainland yearly average of 1524 mm; the Florida Keys are drier with a yearly average of 965 mm at Key West (Tomlinson 1980). Eighty

percent of the rainfall occurs from the beginning of May to the end of October.

Plant communities. Despite a young history, the combination of climate, soils, drainage and geographic location have produced a diverse array of ecological conditions in southern Florida. Plant diversity is high with approximately 1650 species of uncultivated vascular plants known (Long and Lakela 1971). About 150 plant species in southern Florida are endemic to Florida. Aside from the Lakes Region of central Florida, which has the highest number of endemics, a second area of relatively high plant endemism is southern Florida. Collectively, elements in the flora of southern Florida arrived from three directions: 1, from the Caribbean region or tropical America; 2, from the northern temperate regions of the mainland United States, northern and central Florida; and, 3, from Pleistocene refugia within central Florida or the Atlantic Coastal Ridge.

Plant communities of southern Florida can be summarized as follows (Long and Lakela 1971; Tomlinson 1980).

Hardwood hammock (Figs. 2-3). This community is composed of a high diversity of broadleaved trees and shrubs, often with associated palms, that form dense forests in relatively restricted areas. Floristic affinities of the constituent taxa are typically tropical although some temperate elements, particularly oak species, extend southward into hammocks on the mainland. Whereas the hardwood hammock is the typical climax vegetation of most areas of northern and central Florida, the tropical hardwood hammock is the climax assemblage for most of the uplands of extreme southern Florida. Mature tropical hardwood hammocks are best developed in the Everglades National Park (e.g., Royal Palm Hammock [=Paradise Key, Royal Palm State Park], Mahogany Hammock), as small disjunct parks in the southern portion of the greater Miami area into Coral Gables (Old Cutler Hammock, Matheson Hammock, Charles Deering Estate Park, Camp Mahachee), in Chekika State Recreation Area (Grossman Hammock), on Upper and Lower Key Largo and on Big Pine Key (Watsons Hammock). Tree species typical of tropical hammocks are *Bursera simaruba* (L.) Sarg. (gumbo-limbo), *Lysiloma latisiliqua* (L.) Benth. (wild tamarind), *Eugenia* spp. (stoppers), *Ficus aurea* Nutt. (strangler fig), *F. citrifolia* Mill. (wild Banyan), *Dipholis salcifolia* (L.) A. DC (bustic), *Mastichodendron foetidissimum* (Jacq.) Cronquist (wild mastic), and *Coccoloba diversifolia* Jacq. (tie tongue). Distributions in the United States of a number of tree species such as *Swietenia mahagoni* (L.) Jacq. (mahogany), *Hippomane mancinella* L. (manchineel), *Guaiacum sanctum* L. (lignum vitae), *Zanthoxylum flavum* Vahl., and *Thrinax parviflora* Sw. (thatch palm), are restricted to this habitat in south Florida.

Pineland (Fig. 4). This fire-climax community is found on the marly flatlands and rocklands of extreme southern Florida. It is characterized by an overstory of *Pinus elliotti* Engelm. (slash pine) often interspersed with *Serenoa repens* (Bartr.) Small (saw palmetto). Tropical shrubby and herbaceous components are frequently found in the understory. The community is generally dry and quite open with grasses and a variety of herbaceous plants dominating. Wet pineland occurs in low-lying situations that are occasionally flooded. Understory plants can differ quite substantially in the two extremes and wet pineland frequently possesses many plant taxa also found in wet prairies. Extensive pineland occurs in Everglades National Park (Long Pine Key) and on Big Pine Key, otherwise a mixed pineland-hardwood hammock assemblage is found on Sugarloaf Key and No Name Key. On the Keys, pines only grow in areas with an underlying freshwater lens.

Coastal scrub (Figs. 5-6). This community is developed as a narrow band on sandy beaches and coastal dunes throughout south Florida. Driftwood and other washup debris frequently border this habitat or are scattered in the understory. Typical plants are *Coccoloba uvifera* (L.) L., *Uniola paniculata* L., *Sesuvium portulacastrum* (L.) L., *Opuntia* spp.,

Figures 2-12. Terrestrial habitats in southern Florida. Figure 2. Hardwood hammock (Everglades National Park, Royal Palm Hammock). Figure 3. Hardwood hammock (Big Pine Key, Watson's Hammock). Figure 4. Pineland (Everglades National Park, Long Pine Key). Figure 5. Coastal scrub (Big Pine Key, Long Beach). Figure 6. Coastal scrub (Big Pine Key, Cactus Hammock). Figure 7. Mangrove (Everglades National Park). Figure 8. Mangrove; *Jacquinia keyensis* Mez. (Big Pine Key). Figure 9. Prairie (Everglades National Park, near Royal Palm Hammock). Figure 10. Wetland margins (Everglades National Park, near Royal Palm Hammock). Figure 11. Salt marsh/coastal prairie (Everglades National Park, near Flamingo). Figure 12. Introduced/commercial; *Agave sisalana* Perrine (Everglades National Park).


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Solanum spp., *Tournefortia gnaphaloides* (L.) R. Brown and *Suriana maritima* L. More to the inland side, in situations where the band of vegetation is wide, plants more typical of hardwood hammocks intrude. These plants are *Bursera simaruba*, *Eugenia* spp., *Zanthoxylum flavum* and *Z. fagara* (L.) Sarg. Vegetation differs little from that found in the same habitat throughout most of the Caribbean area. The best examples of this habitat are on the southeastern shores of Big Pine Key (Long Beach), Bahia Honda Key and Long Key.

Mangrove (Figs. 7-8). Mangrove swamps occur extensively along the south Florida coasts where wave-energy is low. Three species of trees typically dominate this assemblage. Red mangrove, *Rhizophora mangle* L. is located on the outermost edge with the most exposure to salt water; black mangrove, *Avicennia germinans* (L.) and white mangrove, *Laguncularia racemosa* Gaertn. are found more inland. Another common tree in this habitat, buttonwood, *Conocarpus erecta* L., is found above the furthest reaches of the tides. In dryer and more inland situations, understory plants are frequently those of coastal scrub or salt marsh habitats. Where the mangroves are growing on exposed coral flats, *Jacquinia keyensis* Mez. is a common associate. Mangrove swamps are developed best along the western and southern mainland coasts, and throughout the Keys. Although present, they are narrow and disjunct along the east coast of the mainland.

Prairie (Fig. 9). As with pineland, freshwater prairie habitats in south Florida grade from dry to wet. Wet prairies in southern Florida are best developed in the Everglades National Park, but are also present on Big Pine Key, the only key with significant and persistent freshwater wetlands. Saw grass, *Cladium jamaicensis* Crantz is the dominant plant, particularly in the Everglades. Grasses and sedges are also abundant, less so *Typha latifolia* L., *Sagittaria* spp., *Polygonum* spp. and *Pontederia lanceolata* Nutt. Dry prairies appear to be ecotonal and marginal to pineland or wet prairies.

Wetland margins (Fig. 10). This category includes freshwater marshes and swamps and is characterized by more of the large emergent plants than is the wet prairie, and in many instances also by deeper water such as that of lakes, ponds and rivers which is subject to less significant seasonal variation. This habitat occurs extensively on the mainland in the Everglades National Park and on the Florida Keys only on Big

Table 2: Curculionoidea of southern Florida. Classification follows Kuschel (in press).

	No. genera	No. species
Anthribidae (12; 22)		
Choraginae		
Araecerini	2	2
Choragini	2	2
Anthribinae		
Discotenini	1	1
Eupariini	1	2
Anthribini	1	3
Ormiscini	1	6
Platyrhinini	1	2
Platystomini	2	3
Piesocorynini	1	1
Belidae (1; 2)		
Oxycoryninae	1	2
Attelabidae (3; 3)		
Attelabinae	1	1
Rhynchitinae	2	2
Brentidae (6; 14)		
Apioninae		
Apionini	2	10
Brentinae		
Brentini	3	3
Cyladinae	1	1
Curculionidae (115; 249)		
Brachycerinae		
Entimini	1	2
Polydrosini	9	11
Rhytirrhinini	2	22
Cossoninae		
Cossonini	3	7
Cotasterini	5	6
Onycholipini	1	4
Rhyncolini	3	3
Curculioninae		
Anthonomini	5	19
Baridini	17	32
Ceutorhynchini	6	9
Cryptorhynchini	24	52
Curculionini	1	1
Erirhinini	8	16
Gymnetrini	1	1
Lixini	2	5
Molytini	11	27
Otidocephalini	3	5
Prionomerini	1	1
Rhynchaenini	2	2
Tychiini	2	4
Zygopini	2	2
Rhynchophorinae		
Rhynchophorini	1	1
Sitophilini	1	2
Sphenophorini	4	15

Pine Key. Larger plant species, some of which occur only on the mainland, typically include *Salix caroliniana* Michx., *Cephalanthus occidentalis* L., *Myrica cerifera* L., *Ludwigia* spp., *Typha latifolia* L., *Nuphar luteum* (L.) Sibth. & Sm., *Chrysobalanus icaco* L. and the fern *Acrostichum daneaefolium* Langsd. & Fisch.

Salt marsh-coastal prairie (Fig. 11). These communities cover large parts of coastal southern Florida, generally inland of coastal scrub or mangrove habitats. They can be found around tidal estuaries, inland bays and inlets and may be covered with shallow brackish water. Extensive coastal prairie is found west of Flamingo on Cape Sable in Everglades National Park, and on Big Pine and No Name Keys, and further north, in Collier-Seminole State Park. Typical plants are *Spartina* spp., *Borrichia* spp., *Batis maritima* L. and the chenopods *Suaeda linearis* (Ell.) Moq., *Salicornia* spp. and *Atriplex* spp.

Ruderal-roadsides. These are weedy communities found along the sides of trails and roadways or on disturbed or abandoned lands. Typical plants are *Amaranthus hybridus* L., *Bidens pilosa* L., *Desmodium* spp., *Flaveria linearis* Lag., and *Ipomoea acuminata* (Vahl) R &S.

Commercial-ornamental (Fig. 12). This category is reserved for those plants cultivated for their ornamental or commercial value. Some species are frequent escapees and may now be found in some natural habitats. Examples are avocado, various palms, tamarind, yucca, agave and various citrus.

Superfamily Curculionoidea

The superfamily Curculionoidea is composed of six families; Anthribidae, Nemonychidae, Belidae, Attelabidae, Brentidae and Curculionidae (Kuschel in press). Although not treated here, Scolytinae and Platypodinae are considered to be subfamilies of Curculionidae following Kuschel (in press); the species of these two subfamilies in Florida are currently under review by T.H. Atkinson. Aspects of diversity, distribution and biology of these six families are summarized very briefly following.

Nemonychidae is a small family of some 70 world species; adults and larvae of most species are associated with male flowers of conifers. No species has been found yet in southern Florida although two species of *Cimberis*, *C. elongatus* (LeConte) and *C. pilosa* (LeConte) are known from central and northern Florida where they are associated with species of *Pinus* (Kuschel 1989).

Anthribidae are the fungus weevils although some species feed on pollen of Asteraceae and some are predators of scale insects. There are slightly more than 3000 species in the world but only 87 are recorded from North America (Valentine 1960). The Anthribidae of the Bahamas were reviewed by Valentine (1955).

Belidae is a small family which exhibits a relictual distribution, with most species found in temperate regions of the southern hemisphere and the islands of the Pacific Ocean. There are slightly more than 300 species in the world. Only two species are known in North America.

Attelabidae are the leaf-rolling weevils and their relatives. Approximately 2000 species are known in the world, but only 50 species are found in North America.

Brentidae is a family composed of taxa with a variety of habits. Brentinae are associated with dead wood where they live under bark; Cyladinae (sweet-potato weevils) are associated with the plant family Convolvulaceae; and Apioninae, composed mostly of species placed in the genus *Apion*, are associated with a wide variety of plants. Some 4500 species comprise the world fauna; slightly less than 175 species are known in North America.

Curculionidae, with slightly less than 50,000 described species, is the largest family of organisms known; hypothesized reasons for this diversity are discussed in Anderson (in press a). Virtually all weevil species are associated with plants, particularly a wide variety of angiosperms, and various plant products. Through 1971, slightly fewer than 2200 species were recorded from North America (O'Brien and Wibmer 1978) but this number is probably now closing in on 2500. Not surprisingly this is the most diverse family of Curculionoidea in southern Florida.

At present relatively accurate estimates of the known fauna of Curculionoidea (excluding Anthribidae, Scolytinae and Platypodinae) of Florida can be made from O'Brien and Wibmer (1982), recent publications since 1982 and this study. A less accurate estimate can be made of the diversity of Anthribidae using Arnett (1983). Estimated numbers of genera and species are as follows (particularly diverse genera are noted): Nemonychidae (1;2), Anthribidae (15;32), Belidae (1;2), Attelabidae (8;13), Brentidae (8;37, *Apion* [30]), Curculionidae (174;508, *Listronotus* [40], *Anthonomus* [31], *Conotrachelus* [29], *Sphenophorus* [23], *Tyloderma* [22], *Baris* [19], and *Bagous* [17]). These totals do not include undescribed taxa or

unnamed species included in this study or otherwise known.

Early studies of Curculionoidea in south Florida

Eugene A. Schwarz (1844-1928). Schwarz was probably the first person to collect beetles in an intensive manner in southern Florida. He first collected in Florida in 1875 and 1876 but spent all of his time in the central portion of the state and did not collect "at the southern extremity of the peninsula" (Schwarz 1878). In April of 1887 he had opportunity to return to Florida and, recognizing the paucity of information on the fauna of the extreme southern part of the state, "proceeded at once to Key West" (Schwarz 1888a) where he spent but 5 days and then began to work his way back north. At this time, Key West was a small colony, occupying only the western third of the island. The middle of the island was "occupied by an extremely thick growth of shrub-like trees, not higher than 15 feet, but without much undergrowth. This shrubbery represents what is known as the semi-tropical forest of southern Florida" (Schwarz 1888b). He found collecting to be poor under rocks, sifting leaves and on the "sparse vegetation of herbaceous plants". Rather he found that "the bulk of the fauna is represented by species living in or on the trees of the semi-tropical forest" (ibid.). He noted the lack "of predaceous, rhypophagous and coprophagous Coleoptera and an equally striking preponderance of certain phytophagous families" (ibid.). Curculionoidea were "by far the best represented family in the numbers of species as well as specimens" (ibid.) with Cerambycidae next, and, surprisingly, Ptinidae (mostly now placed as Anobiidae and Bostrichidae) third. He collected 36, 18 and 13 species, respectively, of each group. Of the entire fauna of the island, 36 species were "of general distribution in the more southern portion of the United States; 70 are not found north of Florida, and 52 represent the semitropical fauna" (ibid.). One-fourth of the species he collected were not recorded previously from the United States. He suspected some of the species to be undescribed but cautioned that they were likely to be of West Indian origin and perhaps previously described from that region or at least found to occur there. He concluded that the fauna was of "West Indian origin, and that the region I shall hereafter circumscribe as semitropical Florida does not contain any endemic forms" (Schwarz 1888a). His only mention of weevils was of finding *Cossonus* under the bark of decaying gumbo-limbo (*Bursera simaruba* (L.) Sarg.); and *Pseudomus inflatus*, *Lembodes* and *Erodiscus* on cocoa-plum (*Chrysobalanus icaco* L. [actually, likely a misidentification of *Coccoloba uvifera* (L.) L. or *C. diversifolia* Jacq.]) (Schwarz 1888c).

Table 3. Distribution of species of Curculionoidea (excluding Curculionidae) in southern Florida. Species considered not established in southern Florida are not included.

		Mainland	Upper Keys	Lower Keys	Mainland & Upper Keys	Mainland & Lower Keys	Upper & Lower Keys	Mainland, Upper & Lower Keys	Totals
South Florida	temperate	2	--	--	--	1	--	--	3
	tropical	1	--	1	--	--	--	--	2
Florida	temperate	4	--	--	--	1	--	--	5
	tropical	1	--	--	--	--	--	--	1
S.E. U.S.A.		4	--	--	--	2	--	--	6
Widespread N.A.		6	--	--	--	2	--	4	12
Widespread Neotropical		--	--	--	1	--	--	1	2
Florida & West Indies		1	1	--	--	--	1	4	7
Introduced (tropical)		--	--	--	--	1	--	1	2
Introduced (temperate)		--	--	--	--	--	--	--	--
Introduced (cosmopolitan)		1	--	--	--	--	--	--	1
		20	1	1	1	7	1	10	41

After leaving Key West he appears to have headed north and spent a few weeks on the shores of Biscayne Bay. Here as well as on Key Largo and Elliott's Key, he noted that the "Floridian fauna largely infringes upon the semitropical forest" (Schwarz 1888a). Based on the findings of H.G. Hubbard, he reported the occurrence of insect species of West Indian origin "exclusively in small and isolated thickets of hammock land found at wide intervals in the dense shrubbery back of the ocean beach" along the eastern Florida coast between Capron and Jupiter (ibid.). We now know that the tropical element in southern Florida also extends north along the western coast but in 1888 this area was "the most unknown and least accessible portion of the whole United States" (ibid.).

He published just one description of a weevil species from Florida, *Anchonus floridanus*, in 1894 but various other specimens he collected were described as new species by Linell (1897).